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Indian Standard

SPECIFICATION FOR HIGH DENSITY POLYETHYLENE (HDPE)/ POLYPROPYLENE (PP) WOVEN SACKS COATED WITH PAPER

UDC 621·798·151 : 677·494·742·2/·3

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *November* 1986

Indian Standard

SPECIFICATION FOR HIGH DENSITY POLYETHYLENE (HDPE)/ POLYPROPYLENE (PP) WOVEN SACKS COATED WITH PAPER

Textile Materials Made for Polyolefins (Excluding Cordage) Sectional Committee, TDC 47

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR HIGH DENSITY POLYETHYLENE (HDPE)/ POLYPROPYLENE (PP) WOVEN SACKS COATED WITH PAPER

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 16 June 1986, after the draft finalized by the Textile Materials Made From Polyolefins (Excluding Cordage) Sectional Committee had been approved by the Textile Division Council.

0.2 With the advent of HDPE/PP, woven fabric coated with paper, gradually the paper bags are being replaced by such type of bags due to the achievement of higher strength of HDPE, PP woven fabric and their property of being intert in nature. These bags are generally used for packing polymers, pigments and other powdered chemicals.

0.3 A sack with contents undergoes adverse climatic condition and transport hazards from the manufacturer's end to the user's premises. And depending upon the bulk density of the product, selection of proper type of HDPE/PP woven sacks coated with paper has a direct bearing on the preservation of quality of the products and reaching cansumers in sound condition. The details of the HDPE/PP woven fabric have been given for the guidance of the manufacturers and the users in Appendix A.

0.4 Two types of sacks have been included in this specification, out of which Type I is recommended for use where the sacks are likely to be exposed to more severe handling and transportation condition.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard prescribes the requirements of two types of high density polyethylene (HDPE) or polypropylene (PP) woven sacks coated with paper.

2. MANUFACTURE

2.1 HDPE/PP Woven Fabric

2.1.1 The fabric used in the manufacture of HDPE or PP woven sacks coated with paper shall be woven from monoaxially oriented HDPE tapes (*see* IS : 6192-1984*) or monoaxially oriented PP tapes (*see* IS : 11197-1985†). The minimum width of the tapes used for making fabric shall not be less than 2·5 mm.

2.1.2 The HDPE/PP woven fabric shall have uniform, straight, and tight weaving. The fabric shall generally be free from weaving defects such as pick-points, missing tapes, holes, cuts, tears, and stains and shall be generally free from biasness.

2.1.3 Constructional details of HDPE or PP woven fabric suitable for manufacture of sacks are given in Appendix A.

2.2 Paper

2.2.1 The paper used for coating the HDPE or PP woven fabric shall be kraft paper according to Grade 2 of IS : 1397-1967‡. The mass of the kraft paper shall not be less than 60 g per square metre.

2.2.2 The paper shall be free from all visible defects, such as specks, holes and other blemishes.

2.3 Coating

2.3.1 The HDPE/PP woven fabric manufactured according to **2.1** shall be coated on one side with the kraft paper according to **2.2**.

2.3.2 The coating of the paper shall be directly done on the extrusion lamination coating plant. Low density polyethylene (LDPE) film or any other plastic film of uniform minimum thickness of 25 microns or mass 23 g/m^2 shall be used to coat the paper on HDPE/PP woven fabric. Adhesives or hot melt adhesives may be used for bonding.

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*Specification for monoaxially oriented high density polyethylene tapes (*first revision*).

†Specification for monoaxially oriented polypropylene tapes.

‡Specification for kraft paper (*first revision*).

2.3.3 The coating of the paper shall be free from pin-holes, tears, blisters and any other visible defects. The low density polyethylene (LDPE) used as bonding agent for coating shall be of virgin material of suitable grade.

2.4 Sack

2.4.1 The sacks shall be produced from the HDPE or PP woven fabric coated with paper.

2.4.2 The side (longitudinal) seam of the sack may be either bonded or sewn but the bottom seam of the sack shall be always sewn.

2.4.3 *Bonded Seam* — The material from the reel is folded transversely such that the longitudinal edges overlap normally at the back face of the finished sack. Adhesives (for example, low density polyethylene) introduced into the overlap and pressure is applied to form the bonded seam. The edge of the material shall be overlapped by 30 mm and bonded with a width of bond 15 mm minimum. The bond shall be such as to ensure compliance with the requirements specified in **3.1**.

2.4.4 *Sewn Seam* — The stitching shall be done with single row of chain stitches and the number of stitches shall be 12 ± 2 per dm. The thread used for stitching shall be rayon tyre cord, HDPE/PP tape of 1 000 denier or polyester yarn having sufficient strength. The seam shall first be folded outside to a minimum depth of 20 mm so that two layers of sacks can be stitched by covering with crepe kraft paper. The stitches shall pass through all four layers of HDPE/PP fabric coated with paper with two layers of crepe kraft paper strip. The crepe kraft paper strip having minimum width of 55 mm shall be used. The mass in g/m^2 of crepe kraft paper shall be minimum 100 g. The stitching shall be about 10 mm from the edge of the sack and the same shall be uniform and without and loose thread or knot.

2.5 Liner

2.5.1 A suitable loose liner of low density polyethylene film (LDPE) or any other plastic material line HMHDPE, LLDPE, PVC, etc, as agreed to between the buyer and the seller shall also be supplied.

2.5.2 The thickness of the LDPE liner shall be from 40 to 250 microns. However, it shall not be less than 25 microns in the case of liner made from other type of material. The loose liner shall be at least 5 percent more in length as well as in width of the sack.

2.6 Mouth of the Sack — The mouth of the sack shall be plain or hemmed or heat cut. The mouth of the sack shall be completely open after heat-cut.

2.7 Capacity — The sack shall have a normal capacity to hold 25 kg of material and depending on the bulk density of the material the holding capacity of sack may increase up to 50 kg maximum.

3. REQUIREMENT

3.1 The breaking load of fabric and breaking load of seam of Type 1 and Type 2 sacks shall be as given in Table 1.

TABLE 1 REQUIREMENTS OF HDPE/PP WOVEN SACKS COATED WITH PAPER

Sl No.	Characteristic	Requirement N*, *Min*		Method of Test, Ref to
		Type 1	Type 2	
i)	Breaking load on 5·0 × 20 cm strips, cut from test sample			
	a) warpway (lengthwise)	850	700	IS : 1969-1985† (Modified grab test method)
	b) Weftway (widthwise)	680	600	
ii)	Seam breaking load			
	Side seam	390	390	IS : 9030-1979‡
	Bottom seam	310	310	

*1 newton is approximately equal to 0·102 kgf.

†Method for determination of breaking load and elongation of woven textile fabrics (*second revision*).

‡Method for determination of seam strength of jute fabrics including their laminates.

3.2 Dimensions — The (outside) dimensions shall be as agreed to between the buyer and the seller subject to a tolerance of $^{+3}_{-0}$ percent.

NOTE — The suitable size (outside dimensions) of high density polyethylene (HDPE) woven sacks coated with paper for packing 25 kg of low bulk density material like caprolactum is 550 × 850 mm. This dimension is suitable for maintaining an optimum free space of minimum of 20 percent of length when measured along the surface level of the contents.

3.3 Mass — The mass of the sack shall be as agreed between the buyer and the seller or as declared by the manufacturer subject to the following tolerances:

	Tolerance
a) On a truss of 100 sacks (excluding packing materials)	± 3 percent
b) On an individual sack	± 6 percent

3.3.1 The method of calculating the mass of the sacks is given in Appendix A for guidance.

4. PACKING AND MARKING

4.1 The sacks shall be marked with information as required by the buyer using suitable ink.

NOTE — The common practice of marking involves the use of silk screens or stencils for printing the matter when the number of sacks ordered is small. When large number of sacks are required the normal accepted method is flexo-printing. The inks found suitable for printing are those based on polyamide resins. The shade of the inks should not vary from sack to sack.

4.2 Hundred sacks or multiple thereof shall be packed to constitute a truss, which shall be formed using a layer of HDPE/PP woven fabric or hessian and suitably secured as agreed to between the buyer and the seller.

4.2.1 Each truss containing HDPE/PP woven sacks coated with paper may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 In any consignment all the sacks of the same construction shall be grouped together to constitute a lot.

5.2 The conformity of the lot to the requirements of the standard shall be determined on the basis of the tests carried out on the samples selected from it.

5.3 Unless otherwise agreed to between the buyer and the seller the number of trusses to be selected at random from a lot shall be according to col 1 and 2 of Table 2.

5.4 Number of Tests — The number of sacks to be selected for testing dimensions and mass of sacks shall be according to col 3 of Table 2. Equal number of sacks shall be selected from each truss.

TABLE 2 SAMPLE SIZE AND CRITERIA FOR CONFORMITY

(*Clause* 5.3)

No. of Trusses in the Lot	No. of Trusses to be Selected	No. of Sacks to be Selected	Permissible No. of Defective Sacks
(1)	(2)	(3)	(4)
1	1	5	0
2	2	8	0
3 to 6	3	12	0
7 to 20	5	20	1
21 to 70	8	32	2
71 and above	13	52	3

5.4.1 The number of sacks to be selected for testing breaking load of fabric as well as seam shall be one per truss selected according to col 2 of Table 2 subject to a minimum of two.

5.5 Criteria for Conformity

5.5.1 The lot shall be considered conforming to the requirements given in **3.2** and **3.3**, if the number of sacks not meeting the requirement for any one or more of the characteristics is less than or equal to the corresponding permissible number of defective sacks given in col 4 of Table 2.

5.5.2 The lot shall be considered conforming to the requirements given in **3.1**, if all the sacks tested according to **5.4.1** meet the relevant requirement.

APPENDIX A

(*Clauses* 2.1.3 *and* 3.3.1)

PARTICULARS OF HDPE/PP WOVEN FABRIC AND CALCULATION OF MASS OF SACKS

A-1. SUITABLE FABRIC CONSTRUCTIONS

Sl No.	*Nominal Count Tex (or Denier)*	*Ends/cm*	*Picks/cm*	*Mass, g/m²*
(1)	(2)	(3)	(4)	(5)
i)	88·8 (or 800)	5·5	5·5	100
ii)	99·9 (or 900)	4·7	4·7	100
iii)	111 (or 1 000)	4	4	100

A-2. CALCULATION OF MASS OF SACKS

A-2.1 Total mass of sack comprises: (a) mass of plain HDPE/PP fabric; (b) mass of kraft paper; (c) mass of laminating material, that is, LDPE or any other plastic film; (d) mass of crepe kraft paper strip; and (e) mass of stitching material.

A-2.1.1 Calculate the mass of sack with the help of the following formulae:

a) Mass of plain HDPE/PP fabric, $g_1 = (L + 20\text{ mm}) \times 2\,(W + 20\text{ mm}) \times M_1 \times 10^{-6}$

b) Mass of kraft paper, $g_2 = (L + 20\text{ mm}) \times 2\,(W + 20\text{ mm}) \times M_2 \times 10^{-6}$

c) Mass of laminating material, $g_3 = (L + 20\text{ mm}) \times 2\,(W + 20\text{ mm}) \times M_3 \times 10^{-6}$

d) Mass of crepe kraft paper strip, $g_4 = (L + W) \times W_1 \times M_4 \times 10^{-6}$

e) Mass of stitching material, $g_5 = L_1 \times d \times 10^{-2}$

Mass of HDPE/PP woven sack coated with paper in grams,
$g = g_1 + g_2 + g_3 + g_4 + g_5$

where

L = length of sack in mm;

L_1 = approximate length of stitching thread in cm;

W = width of sack, in mm;

W_1 = width of crepe kraft paper strip in mm;

M_1 = mass of HDPE/PP fabric in g/m²;

M_2 = mass of kraft paper in g/m²;

M_3 = mass of laminating material in g/m²;

M_4 = mass of crepe kraft paper strip in g/m²; and

d = mass of stitching thread in g/m.

NOTE — M_3 = 23 g/m² in case of 25 microns film

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2